THE OCCURRENCE AND LIKELY ORIGINS OF TWO SPECIES OF MISTLETOE AT HERDSMAN LAKE, WESTERN AUSTRALIA

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BACKGROUND

At Herdsman Lake, Perth, Western Australia, there are two species of mistletoe (Loranthaceae), Slender-leaved Mistletoe (*Amyema linophylla*) and Stalked Mistletoe (*Amyema miquelii*). This paper describes their occurrences and discusses their likely origins.

Mistletoes are ecologically important (e.g. Watson 2001). They support various insects, including two butterfly species in the Perth area whose larvae feed on their foliage, the Spotted Jezebel (*Delias aganippe*) and the Satin Azure (*Ogyris amaryllis*) (Braby 2000). They are favoured nesting-sites for many bird species (Cooney *et al.* 2006; Watson 2001, 2002). Their flowers provide nectar for some birds, such as honeyeaters, and their fruits provide food for others, particularly the Mistletoebird (*Dicaeum hirundinaceum*), which is a mistletoe-specialist (Watson 2001, 2002).

On the Swan Coastal Plain (SCP), much of the original vegetation, including mistletoes, has been lost through clearing. In many of the bushlands that remain, mistletoes have been eliminated or reduced in occurrence by frequent fires. The occurrence of mistletoes at a lake on the SCP, such as Herdsman Lake, is therefore significant.

Herdsman Lake is located in the City of Stirling, about 5 km from the ocean and about the same distance north-west of the Perth G.P.O. The lake, comprising areas of open water and beds of the bullrush *Typha orientalis* (Typhaceae), occupies an area of about 300 ha. This and about 100 ha of adjoining land are now set aside as Herdsman Lake Regional Park (Department of Conservation and Land Management 2004). The surrounding land is mostly residential, apart from Osborne Park Industrial Area, which extends to the north-east.

The Park is situated within the sandy, aeolian soils that occupy roughly the western two thirds of the SCP, which, at this latitude, extend about 12 km inland from the coast (Department of Conservation and Environment 1980). Some of its trees and shrubs are

natural to the site (local species); the rest are introduced from other parts of Australia or beyond (non-local species).

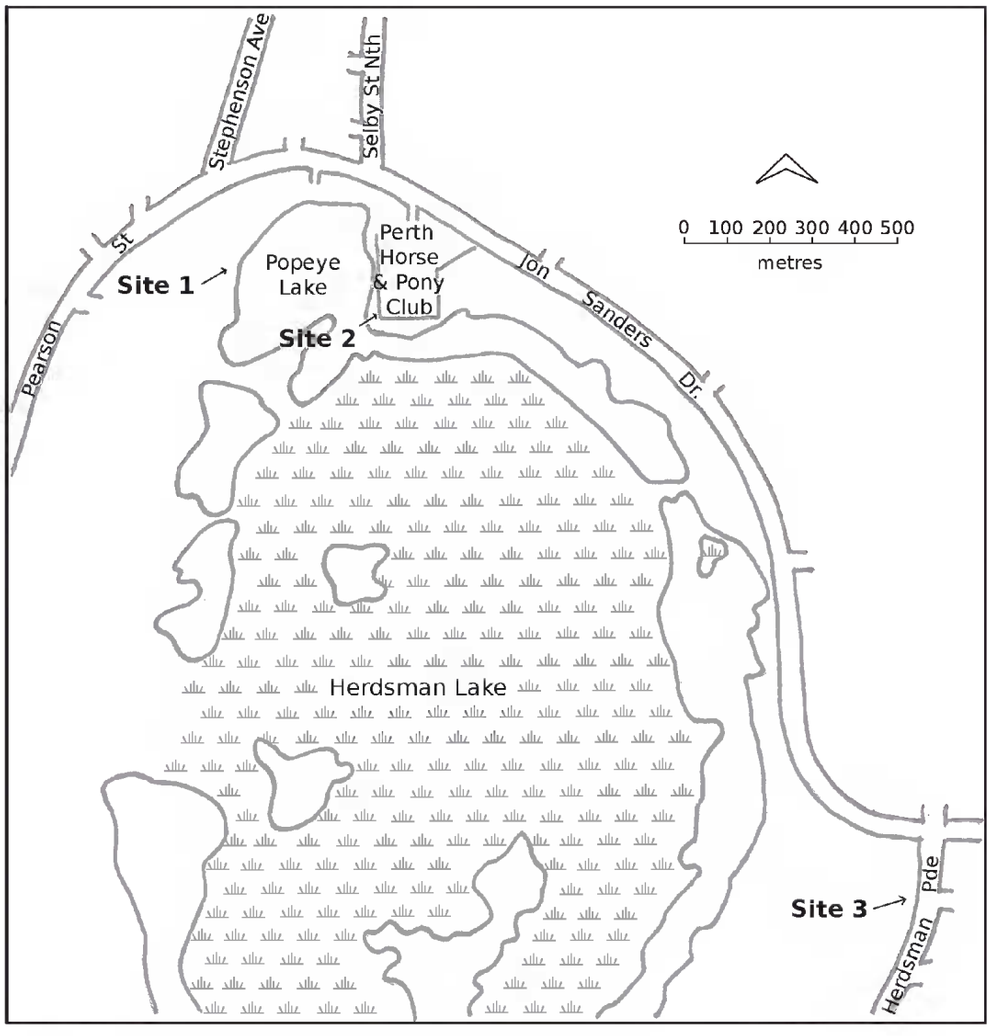
The chief local species, in decreasing order of abundance, are Flooded Gum (*Eucalyptus rudis*, Myrtaceae), Freshwater Paperbark (*Melaleuca rhaphiophylla*, Myrtaceae), Coojong (*Acacia saligna*, Fabaceae: Mimosoideae), Swishbush (*Viminaria juncea*, Fabaceae: Faboideae) and Albizia (*Paraserianthes lophantha*, Fabaceae: Mimosoideae). These species have maintained their presence by natural reproduction or as a result of planting. Flooded Gum and Freshwater Paperbark have been planted quite extensively, particularly along the lake's northern and north-eastern shores. Coojong, Swishbush and Albizia are short-lived. Freshwater Paperbark and Flooded Gum live much longer, and there are specimens of each at Herdsman Lake that were mature and well grown in the 1980s.

The non-local species include various eucalypts and three species of sheoak (Casuarinaceae): River Oak (*Casuarina cunninghamiana*), Horsetail (or Coast) Sheoak (*C. equisetifolia*) and Salt Sheoak (*C. obesa*). River Oak and Horsetail Sheoak do not occur naturally in Western Australia. Salt Sheoak occurs widely in Western Australia. Within the Perth Metropolitan Region it is found in low-lying alluvial soils on the floodplains of the Swan and Canning rivers, and in areas of the Beermullah Soil Association near the eastern side of the SCP, 27 km or more from Herdsman Lake (Department of Conservation and Environment 1980). It does not, however, occur naturally at Herdsman Lake. In a major bushland study it is not listed for any sites on aeolian soils within the Region (Government of Western Australia 2000), and it is not part of the flora of the Region's aeolian soils (Bronwen Keighery, pers. comm.).

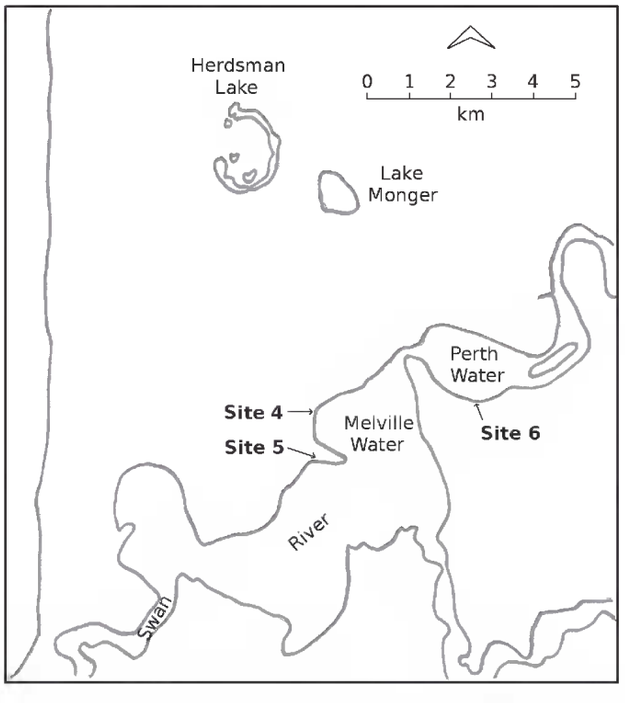
A concept plan for Herdsman Lake was published in 1976 (Metropolitan Region Planning Authority 1976). I recall that most of the planting of the non-local and local trees and shrubs began about that time. The non-local species have been planted mostly in grassed amenity areas, particularly round the western, northern and eastern sides of the lake. Many of the sheoaks were among the first species to be planted.

OBSERVATIONS

In March 2008 I observed Slender-leaved Mistletoe growing on a Salt Sheoak at the northern end of the Park, on the western side of Popeye Lake (Site 1, Map 1). In April 2008 I observed Slender-leaved Mistletoe growing on Salt Sheoaks on the eastern side of Popeye Lake, just north of the south-west corner of the fence that encloses the southern and western sides of land held by the Perth Horse and Pony Club (Site 2, Map 1).



Map 1. Occurrences of mistletoe at Herdsman Lake.



Map 2. Occurrences of Slender-leaved Mistletoe on the Swan River nearest to Herdsman Lake.

About the same time, I found one specimen of Stalked Mistletoe growing on an old Flooded Gum in the east of the Park, immediately south of the entrance to the car park off Herdsman Parade (Site 3, Map 1). The tree also had what appeared to be a long-dead mistletoe, as well as three thickened branch-ends that were probably produced by mistletoe haustoria. The tree is one of a stand of thirteen, mostly old, Flooded Gums. No signs of mistletoes were observed on any of the other trees. I have not done a systematic search of all the Park's Flooded Gums for mistletoe, but on many

leisure walks in the Park, often incorporating a complete circuit of the lake, I have not noticed any more Stalked Mistletoes.

In January 2009 I inspected more thoroughly the Salt Sheoaks near Popeye Lake. At Site 1 they comprised a grove of about 45 trees. Most were of mature size and probably part of the original plantings, but some smaller ones may have been their progeny. All the mistletoes were growing on older trees. I counted a total of 23 mistletoes, 16 on one host at the eastern end of the group and seven more on other trees. As a result of difficulties in observing the mistletoes, however, the number of individual plants may be considerably more. A Mistletoebird was seen in the most heavily infested sheoak.

At Site 2, three Salt Sheoaks were spaced 10–20 m apart. There were at least 20 mistletoe plants on the tree nearest the fence corner, none on the middle tree and two on the third one.

No mistletoes were found on any of the 40 other mature Salt Sheoaks planted elsewhere at Herdsman Lake or on any of the River Oaks or Horsetail Sheoaks planted round the lake.

The nearest place to Herdsman Lake where Salt Sheoak would once have occurred naturally is on the Swan River near The Narrows, between Melville Water and Perth Water; but both banks on this reach were cleared of vegetation long ago. Some Salt Sheoaks have been planted just south of The Narrows, on the western side of Mill Point, but they are still young and, in February 2009, did not host any mistletoes. The nearest Salt Sheoak to Herdsman Lake supporting mistletoe is at Matilda Bay, Crawley, over two km further downstream, immediately south of The University of Western Australia's Watersports Complex (Site 4, Map 2). In July 2009, it supported one live and (what appeared to be) one dead Slender-leaved Mistletoe. This spot is about 7.4 km from the nearest Slender-leaved Mistletoe at Herdsman Lake. The next-nearest places to Herdsman Lake where Slender-leaved Mistletoes grow are near Pelican Point, Crawley (Site 5, Map 2), and the northern end of Coode Street, South Perth (Site 6, Map 2), about 8.5 and 9.2 km respectively away from the Herdsman Lake mistletoes. A much larger population of Salt Sheoak is to be found in Canning River Regional Park, about 16 km south-east of Herdsman Lake, and Slender-leaved Mistletoe is abundant there.

It is possible that Slender-leaved Mistletoe may occur on planted Salt Sheoaks nearer to Herdsman Lake; but this host is rarely planted in Perth's suburbs except in or near wetlands (pers. obs. over many years of noting trees planted in Perth's suburbs). In February 2009 I found no mistletoes in revegetation plantings of Salt Sheoak and two eastern Australian species (River Oak and Swamp Oak) at Lake

Monger, 1–2 km south-east of Herdsman Lake. These trees were young, the earliest plantings being in 1999 (Ross Bowman, Town of Cambridge, pers. comm.). Other lakes within 10 km of Herdsman Lake are Perry Lakes, Lake Claremont, Lake Gwelup, Lake Karrinyup, Big Carine Swamp and Star Swamp. In February and March 2009, I checked all except Lake Karrinyup. Salt Sheoaks had been planted in recent years at some of them but no Slender-leaved Mistletoe was found. No sheoaks have been planted at Lake Karrinyup (pers. comm. the groundsman, Lake Karrinyup Country Club). Two major bushlands are situated within 10 km of Herdsman Lake, Kings Park and Bold Park, but Slender-leaved Mistletoe has not been recorded at either (Bennett 1988, Barratt and Tay 2005).

DISCUSSION

In southwestern Australia, Stalked Mistletoe grows mainly on eucalypts (Rye 1987). The signs of former mistletoe haustoria observed on the Flooded Gum at Site 3 indicate that Stalked Mistletoe has been present in the area for some time. A photograph published by Powell and Emberson (1978), entitled *Timber: Herdsman's Lake*, taken before 1930, shows an undulating landscape supporting open woodland of eucalypts and banksias. The eucalypts, at least in the foreground, appear from their habit and pale bark to be Tuart (*Eucalyptus gomphocephala*). At least two of them appear to support mistletoes. The dominance of Tuart and the hilly landscape suggest that the picture was taken somewhere to the west of the lake, probably in what is now the Perth suburb of Wembley Downs: the vegetation and terrain are similar to those still present at Hale School.

Stalked Mistletoe is still very common on Marri (*Corymbia calophylla*) and Wandoo (*Eucalyptus wandoo*) in Perth's eastern suburbs, and occurs less commonly on Flooded Gum and Tuart on the SCP (A.N. Start, pers. comm.). Within 10 km of Herdsman Lake, it persists on Marri in Kings Park and near Birdwood Parade, Dalkeith, and on Tuart in Bold Park (my observations and also A.N. Start, pers.comm.). The Herdsman Lake population (albeit now reduced to one plant) may thus be a remnant of the original vegetation.

Salt Sheoak is the only host plant on which Slender-leaved Mistletoe is known to grow in the Perth Metropolitan Region (Rye 1987, A.N. Start pers. comm.). As the host does not occur naturally at Herdsman Lake or anywhere else in the belts of aeolian soils within the Region, Slender-leaved Mistletoe probably did not occur naturally at Herdsman Lake or any lakes near by. It is likely, therefore, that Slender-leaved Mistletoe has been transported to Herdsman Lake since 1976 as seed from other populations. The

nearest of these are on the Swan River, 7.4–9.2 km away. A more probable source may be the abundant population in Canning River Regional Park, at a distance of at least 16 km.

The Mistletoebird is known to be a common disperser of Australian mistletoes. It has been recorded from many localities in the Perth Metropolitan Region (Van Delft 1997), and was seen near Slender-leaved Mistletoes at Herdsman Lake. It is a relatively fast-flying bird, capable of speeds of about 40 kph. It could easily travel between Canning River Regional Park and Herdsman Lake in less than 30 minutes, which is the approximate time that a mistletoe berry takes to pass through the bird's digestive tract (John Dell, pers. comm.).

No Slender-leaved Mistletoe was found on any other species of sheoak growing at Herdsman Lake or elsewhere at sites visited during this study, supporting Rye's (1987) assertion that Salt Sheoak is the only host to Slender-leaved Mistletoe in the Perth Region.

Since Salt Sheoak does not occur naturally within the belts of aeolian soils on the SCP within the Perth Metropolitan Region, it should not be included in projects that aim to restore the natural vegetation of any wetland or dryland sites within that area. At Herdsman Lake it would be desirable to keep the specimens of Salt Sheoak that have been planted in grassed amenity areas, because the Slender-leaved Mistletoe they support benefits various bird and insect species. Because Salt Sheoak does not occur naturally at Herdsman Lake, however, specimens planted, or seedlings that come up, in the more natural parts of the Regional Park should be removed.

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